

REMARKS/ARGUMENTS

In view of the following remarks reconsideration of the pending claims is respectfully requested.

Claims 1 – 48 have been rejected under 35 U.S.C. § 103(a) as being obvious over Heikkila in combination with U.S. Patent No. 4,294,654 to Turner. Applicants respectfully traverse this rejection.

The primary reference, Heikkila, is directed to a process for the preparation of xylose from a paper-grade hardwood pulp which includes treating the pulp with a xylanase enzyme treatment. See Abstract. Heikkila repeatedly emphasizes that the process is directed to extraction of xylose from paper-grade pulp. See for example, Abstract; Column 1, line 8 – 12; column 5, lines 14 – 16; Examples 1 – 21 and the Claims. In particular, Heikkila teaches the desirability of using an enzyme to recover xylose from a paper grade pulp. After xylanase treatment and removal of the xylan, the resulting pulp could then be used as a dissolving pulp. See column 5, lines 43 – 49. Thus, one of the end products of Heikkila's process is a dissolving grade pulp.

Turner is directed to a process of delignification (i.e., removal of lignin from unbleached pulp) and bleaching of lignocellulosic pulp using a photo-oxygenation reaction. See column 2, lines 45 - 52. Turner has absolutely no relation to a process for the production of xylose, and in fact, is completely silent with respect to the removal or recovery of xylose from the pulp. In particular, Turner teaches a process in which a stream of oxygen gas is introduced into a lignocellulosic pulp slurry. See column 3, lines 51 – 53. The pulp slurry is then irradiated with ultraviolet light that delignifies and bleaches the lignocellulosic pulp. See column 4, lines 1 – 27. In other words, Turner teaches a process for removing lignin from prehydrolyzed pulp using oxygen and ultraviolet light.

To establish a *prima facie* case of obviousness, three basic criteria must be met: 1) the prior art reference (or references when combined) must teach or suggest all the claim elements; 2) the combination of references must provide a predictable result; and 3) there must be a reasonable expectation of success. Further, the Office has to provide an explicit basis for combining the references.

In KSR International Co. v. Teleflex Inc, 127 S. Ct. 1727, 1739 (U.S. 2007), the Supreme Court held that in determining obviousness, one must look to whether the combination of the elements provides a predictable result. In the present case, one of ordinary skill in the art would not be motivated to use the prehydrolyzed pulp of Turner in the process of Heikkila for several reasons. In particular, Turner and Heikkila cannot be combined in a predictable way to arrive at the claimed invention. In fact, the proposed combination is contrary to the teachings of the references.

First, Heikkila and Turner are directed to two very different and distinct purposes. As such, there can be no basis for asserting that the result of using a prehydrolyzed pulp, such as the one described in Turner, in the process of Heikkila would provide a predictable result, let alone provide the claimed invention. As noted above, Heikkila is directed to the production of xylose from a paper grade pulp using an enzymatic treatment. Turner on the other hand, is directed to a process for removing lignin from prehydrolyzed pulp using oxygen and ultraviolet light. As such, these patents and their respective teachings are completely unrelated to each other. In paragraphs 8 - 9, Dr. Li provides several reasons why one of ordinary skill in the art would not be motivated to use the pre-hydrolyzed pulp of Turner in the process of Heikkila. As noted in Dr. Li's Declaration, the process and objective of Heikkila is quite different from the problem addressed by Turner, namely the removal of lignin from prehydrolyzed pulp using oxygen and ultraviolet light, whereas Heikkila is directed to using a xylanase treatment to recover xylose from a paper grade pulp. These two processes are completely different from each other and they include no teachings that would lead one of ordinary skill to combine them as contemplated by the Examiner. There is no basis for asserting that these disparate teachings can be combined to provide a predictable result. That is, one of ordinary skill in the art would not predict that the combination of Turner and Heikkila would produce the claimed invention. A person of ordinary skill in the art would not look to the teachings of Turner for a pulp to be used in the xylanase enzyme treatment process of Heikkila.

Additionally, Heikkila's process repeatedly emphasizes the benefits and advantages of using a paper grade pulp. In fact, Heikkila specifically teaches that it is the enzymatic treatments of paper grade pulp that results in the significant recovery of xylose. In contrast to Heikkila,

Turner's pulp is a prehydrolyzed (i.e., dissolving grade pulp). Paper grade pulp and prehydrolyzed pulps are significantly different from each other and have different chemical structures, properties, and end uses. In view of these significant differences, there is no basis for asserting that it would be obvious to substitute the prehydrolyzed pulp of Turner for the paper grade pulp of Heikkila because the outcome would be uncertain at best. Accordingly, it cannot be predicted that the use of a prehydrolyzed pulp, such as that described in Turner, in the process of Heikkila would arrive at the claimed invention. For this additional reason, the claimed invention is patentable over the cited references.

Further, it is clear that the Examiner is attempting to combine the references based solely on the fact that the Turner patent discusses a prehydrolyzed pulp. There are no teachings in either of the references that would lead one of ordinary skill in the art to substitute the paper grade pulp of Heikkila with the prehydrolyzed pulp of Turner, or that the result of such combination would result in a predictable outcome. In fact, Heikkila includes numerous statements that teach away from the use of dissolving-grade pulps, such as prehydrolyzed pulp, as a source of xylan/xylose. For example, Heikkila states at column 3, lines 3 – 7 that [t]he additional purification, which involves treatment with alkali to remove and destroy hemicelluloses and bleaching to remove and destroy lignin reduces the yield and increases the cost of "dissolving-grade" cellulose derived from wood pulp", and at column 3, lines 3 – 7, Heikkila describes that the processes used in preparing dissolving-grade pulps would result in decreased yields of pulp. Heikkila further states "[t]he low molecular weight of some of the hemicellulose fragments makes them hard to isolate, while in some cases (prehydrolysis kraft), the harsh conditions convert the hemicelluloses to decomposition products." See column 2, lines 41 – 44 (emphasis added). From these excerpts it can be clearly seen that Heikkila includes numerous statements that lead away from using a dissolving-grade pulp (i.e., a prehydrolyzed pulp) because the processes involved in the prehydrolysis process results in decomposition of the hemicellulose components, such as xylan. Based on these excerpts, it can clearly evident that the proposed modification would not provide a predictable result. Thus, one of ordinary skill in the art would not be motivated to use a prehydrolyzed pulp in the process of Heikkila, let alone in a process for producing a xylose.

One of the preferred objectives of Heikkila is the simultaneous recovery of xylose along with the production of a dissolving grade pulp. For example, Heikkila states “[i]n a preferred embodiment, the process of the present invention further comprises [the] simultaneous production of dissolving-grade pulp of very high quality and high yields of xylose.” See column 5, lines 43 – 49. Thus, one of the objectives of Heikkila’s process is the simultaneous production of both xylose and a dissolving grade pulp. However, as established in Dr. Li’s Declaration of October 31, 2007, a prehydrolyzed pulp is a dissolving grade pulp. As such, one of ordinary skill in the art would not select the use of a dissolving grade pulp (i.e., the prehydrolyzed pulp of Turner) as a starting product in the process of Heikkila. As discussed in paragraph 8 of Dr. Li’s Declaration, one of ordinary skill in the art would not use the prehydrolyzed pulp of Turner in Heikkila’s process because it would serve no purpose to modify the Heikkila process to include a desired end product as a starting product. Accordingly, one of skill in the art would not be motivated to modify the process of Heikkila to substitute a paper grade pulp with the prehydrolyzed pulp of Turner.

Moreover, using the prehydrolyzed pulp of Turner in the process of Heikkila would result in the pulp being unsatisfactory for its intended purpose. This is a clear indication that there exists a lack of predictability in arriving at the claimed invention based on the combination of Heikkila and Turner. In paragraph 9 of the accompanying Declaration, Dr. Li states that substituting Turner’s prehydrolyzed pulp for a paper grade pulp in the process of Heikkila would result in significant loss of pulp viscosity, which would render the resulting pulp unusable. In particular, Dr. Li’s Declaration establishes that if a prehydrolyzed kraft pulp, such as the one described in Turner, is treated in accordance with Heikkila’s process, the resulting pulp would have an IV that would be too low to be used as a dissolving grade pulp. As such, the proposed modification would prevent one of the primary objectives of Heikkila and would make the resulting pulp unsatisfactory for its intended purpose. Accordingly, one of ordinary skill in the art would avoid using a prehydrolyzed pulp in the process of Heikkila.

Finally, the Examiner has provided no reasonable basis which would motivate one of ordinary skill in the art to make the proposed modification. The Examiner has attempted to gloss over this lack of motivation by stating that Turner teaches that the use of prehydrolyzed pulps

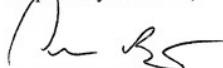
are known in the art. However, the Supreme Court in *KSR* stated that in making an obviousness rejection, the Office must provide an explicit basis for making the combination. The Office has failed to do this. The fact that procedures involving a prehydrolyzed pulp may be known is not sufficient basis to provide motivation to use the pulp of Turner in the process of Heikkila. This is particularly true given the numerous reasons set forth by Dr. Li why one of ordinary skill in the art would be motivated to not make such a modification.

In view of the foregoing remarks it is respectfully submitted that the rejections under 35 U.S.C. § 103 have been overcome, and that the pending claims are in condition for immediate allowance.

Conclusion

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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